

**ANNUAL REPORT**  
**FOR GENERATED CARBON**  
**EMISSIONS**

*PROJECT "BIOMASS BOILER"*  
*SVILOSA CO,*  
*Svishtov, Bulgaria*

PREPARED FOR THE WORLD BANK  
CUSTODIAN OF THE PROTOTYPE CARBON FUND (PCF)

APPROVED BY: Dipl. Eng. M. Kolchev – Chief Executive Director

*January 2009*  
*The town of Svishtov, Bulgaria*



**Responsible Care**

**ISO 14001:2004**



Certificate of approval № 23020-A

**ISO 9001:2000**

Certificate of approval № 170240

## **I. Introduction**

Svilosa AD through its main daughter company Svilocell EAD is the sole producer of bleached kraft pulp and products thereof in Bulgaria. As a raw material hardwood is used, e.g. beech, oak, poplar and acacia. After debarking of the logs and cutting into chips the wood is cooked. The obtained pulp is washed, sorted and bleached, after that is dried and baled in sheet and blocks. During cooking is used the conventional sulphate (kraft) process, and the bleaching includes oxygen delignification, oxygen-alkaline treatment and treating with chlorine dioxide. The processed cooking solution is congested in the Evaporation Plant (EP) and is burnt in the Sodium Recovery Boiler (SRB) in order to regenerate chemicals.

The development of the market for reduced carbon emissions gave opportunity to *Svilosa Co* to choose the approach “Combined implementation” and to invest in a project for energy production from renewable source and utilization of the waste barks. The major goals are:

- Avoids the disposal of the fresh waste;
- Utilization of the energy potential of the barks;
- Evasion of the methane emissions from the bark decay;
- Reduction of the methane emissions from the already disposed wood waste;
- Reduction of the amount of burned coals;
- Reduction of the CO<sub>2</sub> emissions as a result of substitution of the coals with biomass.

The project has positive impact on the environment concerning the emission reduction of green house gasses and the air purity in the region, as well as for avoidance of the disposal of waste biomass in future.

Our main aim is to strengthen the leadership in the Balkans and Europe’s pulp industry. To reach it the company is following a competitive investment strategy. The company is being implemented an investment strategy for increasing of pulp production by improvement of its energy efficiency and accomplishment of the necessary investments to meet the ecological requirements of EU (IPPC BAT).

In September 2007 started the Reconstruction for production capacity increase of Svilocell EAD – the main subsidiary of Svilosa. During 2008 the activities for the tuning of the machinery and equipment were started as well as tuning of the process parameters. Tests for proving of guaranteed parameters of the key equipment were carried out. During this tuning period significant malfunctions occurred, elimination of which led to frequent stops of the production process. This influenced the Biomass boiler operation for the heat energy generation as well.

## **II. Structural and organizational changes**

With our letter № 845/9.V.2006 we have informed you about the carried out structural changes in the company – the Pulp mill was divested as a separate joint stock company Svilocell EAD, which is 100% owned subsidiary of Svilosa AD.

The production structure includes:

- Production Installation for bleached kraft pulp;
- Installation for production of CMC;
- Water supply, sewerage and communications.

In accordance with section 10.11 Assignment (a) of the signed on September 24<sup>th</sup> 2003 Emission Reductions Purchase Agreement between Svilosa AD, Svishtov and the World Bank, as a trustee of PCF, Svilosa AD assigns all rights and obligations regarding the Agreement to the company Svilocell EAD.

In this relation, considered from January 1<sup>st</sup> 2006 the operator of the installation Biomass Boiler and Biomass Depot is Svilocell EAD, but Svilosa AD participates 100% in the company' capital via an installment in kind and is a sole-owner of the shares.

The required actions for changes in the project management organization and the Management and Monitoring of the System were carried out.

The corresponding authorities were informed for all conducted activities.

From the Ministry of Environment and Waters in Bulgaria raised the question for signing of a new Letter of Approval, in which Svilocell EAD to be noted as a supplier of the reduced emission units. The issue was discussed with MoEW as well as with World Bank as a part of the Agreement. The final conclusion is that Svilosa AD as a sole owner of Svilocell EAD remains the solely part under the Emission Reduction Purchase Agreement (ERPA).

Since July 2008 Mr. Yordan Gaydarov has been appointed for the position of Svilocell EAD' Executive Director.

Mill Director – Mr. Plamen Petrov was appointed as Biomass Boiler Project Manager.

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### **III. Biomass Boiler**

#### **1. Technical properties**

In 2003 in Svilosa was erected and launched Boiler for Biomass and production of heat power for the production process in the Pulp Mill. As a primary fuel is used the fresh barks from the logs that are waste from the preparation of the wood for cooking and deferred bark. The produced heat power reduces the necessity of heat, produced in the Electric Power Station, as well as the quantity of used coal.

The basic installation properties are as follows:

- Fuel: wood barks (fresh and deposited)
- Quantity of fed fuel: 12 500 kg/h barks with moisture 65% and calorific value 1000 ccal/kg
- Capacity: 14t/h concentrated steam with pressure 13 bars
- Power: 11 MW

The basic processes are fuel preparation, fuel feeding, bark burning and production of steam for the production process. The ashes from the under-grate space and the captured by the multi-cyclone are collected in a closed container for deposit.

The installation was designed and erected by “Polytechnicks” Ltd. company – Pleven, Bulgaria.

At the beginning of 2004 within the period of Boiler’ introduction in operation and reaching of the design properties (capacity and power) occurred considerable problems, solving of which ended in the end of April. Since May 2004 the Boiler is under normal operation.

## **2. Changes and maintenance**

In order to avoid entering of long wood pieces in the furnace and to provide filtering out of the water from the barks at the exit of the raw material preparation department was assembled a wood-chipping machine.

For providing of normal processing of the installation at the inlet of the burning chamber, additionally is assembled device for capturing of metal particles/pieces.

Concerning the arisen accidents, a journal is filled in, where are stated the type, date and hour of the failure. Measures for their timely removal are being taken.

For the burning process optimization, close to the installation is defined site for temporary storage of the fresh waste and reduction of its moisture content.

In 2005 have been performed the following upgrades of the installation:

On May 22<sup>nd</sup>, 2005 is assembled and launched a third feed pump. The pump is produced by a Bulgarian manufacturer. It is assembled in order to increase the safety of the installation.

On May 23<sup>rd</sup> 2005 is assembled and launched second ventilator for smoke fan. Its assembly is motivated by the necessity to guarantee the efficiency of the installation, the safe and effective operation of the multi cyclone.

In April 2006 was purchased and installed a new flow meter for measuring the generated heat energy.

In November 2008 new flow meter for measuring the generated heat energy was installed on Biomass Boiler.

#### IV. Generated carbon emissions

The amount of generated reduced emissions (t CO<sub>2e</sub>) and their correspondence with the preliminary contractually agreed are shown in table 1:

*Table 1*

year	<i>First amendment of the Emissions Reductions Purchase Agreement ( 7.05.2004)</i>	<i>Reduced carbon emissions according to the report of Svilosa</i>	<i>Verified Carbon Emissions</i>
	ERs, t CO <sub>2e</sub>	ERs, t CO <sub>2e</sub>	ERs, t CO <sub>2e</sub>
2004	17 000	18 938	18 935
2005	37 000	43 324	45 449
2006	33 000	48 445	48 445
2007	48 000	33 053	33 053
2008	53 000	45 959	

In execution of the Emissions Reductions Purchase Agreement (ERPA) the first annual verification of carbon emissions related to the project was performed within the period January 31<sup>st</sup> – February 3<sup>rd</sup> 2005 by JCI /Japan Consulting Institute/, Japan. The results from the verification were summarized in report № JCI-CDM-VER-003-1, Revision No.00, certifying reduction of 18,935 tons of carbon emissions for the period May 2004 – December 2004 inclusive.

Within the period February 27<sup>th</sup> – March 2<sup>nd</sup> 2006 was carried out the second annual verification for certifying the quantity of reduced emissions for 2005. The results from the verification were summarized in report № JCI-CDM-VER-003-1-2P, Revision No.00, certifying the reduction of 45 449 tons of carbon emissions in 2005.

Within the period February 26<sup>th</sup> – March 1<sup>st</sup> 2007 was carried out the third annual verification for certifying the quantity of reduced emissions for 2006. The results from the verification were summarized in report № JCI-CDM-VER-003-1-3P, Revision No.00, certifying the reduction of 48 445 tons of carbon emissions in 2006.

Within the period March 6<sup>th</sup> – 7<sup>th</sup> 2008 the fourth annual verification for certifying the quantity of emission reduction for 2007 was carried on. The results are summarized in a Report № JCI-CDM-DOM-07/017, Revision No.01, certifying the reduction of **33 053 tons of carbon emissions** in 2007.

The reports are stored in the office of the project manager.

## **V. Project Management**

### **1. System for management and monitoring**

System for management and monitoring is formed for determination of the responsibilities concerning collection, registering and documenting of the data, necessary for the emissions' calculation and facilitation of the verification processes and certification of the achieved reduced emissions. The personnel, responsible for the process data management is familiar with the procedures from the System for management and monitoring. The responsibilities are clearly defined. A project manager is appointed to control the tasks implementation. Quality manager controls the procedure fulfillment and the data quality for constant improvement of the Management and Monitoring System.

During the Fourth Periodic Verification no FARs were assigned.

Sustainability and improvement of the incorporated system is secured through external and internal audits.

During the internal audit, carried out in September 2008, fulfillment of the following was examined:

- Instruction H\_10\_ZC "Assurance and control of the measuring devices"
- Instruction H\_14\_ZC "Repair and maintenance of the machinery and equipment"

### **2. Data management**

All necessary data for calculation of the amount of reduced emissions is collected and filled in the electronic workbook in Excel format. The requirements and principles for data collection in the database of the company are observed.

A contract between *Svilosa Co* and CHPP Svilosa AD is concluded for providing of the necessary information during the project operation.

The Project Manager stores all references, signed and sealed.

## 2.1. Single inputs

Prior to the project beginning *Svilosa* carried out 24 horary experiments with the different species of wood. The results are provided in table 2.

Table 2

№	Indicators	Units	Species of the used wood			
			Beech	Turkey oak	Acacia	Poplar
1	Date of the test implementation		17.11.2003	19.11.2003	21.11.2003	11.12.2003
2	Pulp output 1	t	167	159	161	157
3	Quantity of the used wood 2	t	668	636	644	707
4	Wood moisture 3	%	39,55	42,49	39,06	55,59
5	Quantity of the used absolutely dry wood 4	t	403,8	365,8	392,5	313,8
6	Quantity of the obtained waste – barks 5	t	131,20	147,76	143,37	87,96
7	Barks moisture 3	%	68,58	68,61	67,37	78,09
8	Quantity of the absolutely dry barks 6	t	41,18	46,43	46,78	19,27
9	Barks caloricity 8	Gcal/t	0,72	0,67	0,82	0,78
10	Quantity of the obtained waste – shavings 5	t	20,57	20,44	20,44	11,22
11	Shavings moisture 3	%	39,55	42,49	39,06	55,59
12	Quantity of the absolutely dry shavings 7	t	12,43	11,76	12,46	4,98
13	Shavings caloricity 8	Gcal/t	2,26	2,19	2,31	1,51
Notes:						
1 – the quantities are specified by produced pulp bales weighing during the tests implementation						
2 – the quantities are specified in calculative way using the specific costs of wood from the respective species per production unit						
3 – the moisture content is specified in laboratory by analysis of 3 pieces of average tests						
4 – the quantities are found in calculative way as a product of the input wood quantity and the content of dry substance in it (row 3 of the table * (100 – row 4 of the table))/100						
5 – the quantities are specified by weighing of the trucks with barks (shavings, respectively) that are obtained during the tests implementation						
6 – the quantities are found in calculative way as a product of the weighed barks quantity and the content of dry substance in them (row 6 of the table * (100 – row 7 of the table)/100)						
7 – the quantities are found in calculative way as a product of the weighed shavings quantity and the content of dry substance in them (row 10 of the table * (100 – row 11 of the table))/100						
8 – the caloricity is specified by a laboratory analysis of 3 pieces of average tests						

From the data in *Table 2* are defined the following properties:

- Determination of the subordination between produced pulp (at standard moisture) and used wood (on the basis of dry material);
- Determination of the subordination between the used wood and the generated technological waste (barks and shavings);
- Calculation of moisture and caloricity of fresh barks and shavings by wood species (poplar, oak, acacia, beech);
- Proportion of used wood / produced pulp per species.

The heat efficiency of the Biomass Boiler is defined during the 72 – horary test.

The determined factors for one time entries and admissions remain unaltered. In table 3 is presented all data subject to single input in the electronic workbook

*Table 3*

<b><u>Fixed conversion factors</u></b>	<b>Units</b>		
Density of CH <sub>4</sub>	kg/m <sup>3</sup>	0,654	
Conversion from CH <sub>4</sub> to CO <sub>2</sub> e		21	
Biomass boiler efficiency	%	77,73	
<b>Wood Consumption (dry) to Pulp Production (process mc)</b>	<b>Units</b>		
Acacia	%	244	
Beech	%	242	
Oak	%	230	
Poplar	%	200	
<b>Process waste to input wood ratio (dry basis)</b>	<b>Units</b>		
Acacia	%	15	
Beech	%	13	
Oak	%	16	
Poplar	%	8	
<b>Ratio of wood waste (dry basis)</b>	<b>Units</b>	<b>Bark</b>	<b>Shavings/ Saw dust</b>
Acacia	%	79	21
Beech	%	77	23
Oak	%	80	20
Poplar	%	80	20
<b>Moisture Content of wood waste</b>	<b>%</b>	<b>70</b>	<b>44</b>
<b>Calorific Value of waste</b>	<b>Units</b>	<b>Bark</b>	<b>Shavings/ Saw dust</b>
Acacia	MWh/tonne	0,96	2,69
Beech	MWh/tonne	0,84	2,62
Oak	MWh/tonne	0,77	2,54
Poplar	MWh/tonne	0,9	1,75
<b>Stock piled waste</b>	<b>Units</b>		
Moisture Content	%	46	
Calorific value (ambient moisture content)	MWh/tonne	1,6	

## 2.2. Monthly inputs

Each month data is entered in the electronic workbook concerning:

- Biomass boiler heat output, MWh/month (table 4);
- Pulp output per species, t/month (table 5)

The data for these indicators for 2008 are shown in tables 4 and 5.

*Table 4*

Year	2008	2008	2008	2008	2008	2008
Month	January	February	March	April	May	June
Heat output	1430,000	2678,000	2704,000	2742,000	2722,000	3504,000

*Table 4 – extension*

2008	2008	2008	2008	2008	2008
July	August	September	October	November	December
3622,000	4816,000	2179,000	1808,000	1782,000	4148,000

*Table 5*

Year	2008	2008	2008	2008	2008	2008
Month	January	February	March	April	May	June
Poplar	0,000	0,000	0,000	0,000	0,000	0,000
Mixed	3072,271	4478,626	7539,149	7130,472	7683,707	7159,792

*Table 5 - extension*

2008	2008	2008	2008	2008	2008
July	August	September	October	November	December
0,000	0,000	0,000	0,000	0,000	0,000
8005,507	8722,288	5733,918	2322,228	5515,429	5593,230

## 2.3. Annual inputs

Annually in the electronic workbook is entered data for:

- CO<sub>2</sub> emission factor of coal;
- Calorific value of coal;
- Thermal efficiency of CHPP.

Due to change in the wood delivery order the electronic model is being modified, as a new Sheet 8 *Blended wood consumption* is added for monthly data input and determination of the percentage ratio of received wood species.

The responsible person for the electronic workbook filling monthly enters data from the reference for delivered wood per species. The results from this Sheet are utilized as inlet data for page 4, cells D15, D16, D17 till L15, L16, L17.

The indicators' data for 2008 are shown in table 6.

*Table 6*

<b>Annual Conversion Factors</b>	<b>Units</b>	<b>2008</b>
CO2 emission factor of coal	kgCO2/t	
Calorific value of coal	MWh/tonne	
CHPP thermal Efficiency	%	
<b>Blended wood consumption ratios</b>	<b>Units</b>	<b>2008</b>
-Acacia	%	3,6
- Beech	%	12,7
- Oak	%	83,7

## 2.4. Others

For the performance of the operative and monitoring responsibilities of the Monitoring Plan, the Project Operator collects regularly data and information for:

- Production of process heat from CHPP – MWh/month (table 7);
- Total generated electricity from CHPP, MWh/month (table 8);
- Delivery of wood, tons/month (table 9);
- Modifications in CHPP and ancillary plant;

The records for these indicators for the 2008 are shown in tables 7, 8 and 9.

*Table 7*

Year	2008	2008	2008	2008	2008	2008
Month	January	February	March	April	May	June
Heat energy						

*Table 7 – extension*

2008	2008	2008	2008	2008	2008
July	August	September	October	November	December

*Table 8*

Year	2008	2008	2008	2008	2008	2008
Month	January	February	March	April	May	June
Electric energy						

*Table 8 - extension*

2008	2008	2008	2008	2008	2008
July	August	September	October	November	December

Table 9

Year	2008	2008	2008	2008	2008	2008
Month	January	February	March	April	May	June
Acacia	0,000	54,040	892,179	1102,216	153,120	40,920
Beech	1664,840	3653,560	9370,094	7993,660	8278,485	7377,880
Oak	604,100	7765,645	23137,448	6919,812	7412,291	7633,820

Table 9 - extension

2008	2008	2008	2008	2008	2008	
July	August	September	October	November	December	Total
0,000	526,825	215,400	411,567	974,165	1882,652	6253,084
7580,724	6879,160	4998,280	6380,860	9154,480	6133,400	70465,423
10818,420	14970,993	10982,393	15618,749	21276,408	9901,290	137041,369

## **2.5. Implementation of the EU Directive for the waste depots**

*Svilosa Co* is committed to constant quality improvement of the environment and cooperates to the Ministry of Environment and Waters (MoEW) for the implementation and adaptation of the European Legislation in Bulgaria.

According to the Monitoring Plan of the project *Svilosa* makes annually an official inquiry to the Ministry of environment and waters regarding the progress in the legislation in the area of depots and the put into compliance of their sites in correspondence with the execution and coming into force of Directive 99/31/EU regarding dung hills. In order to collect the necessary information was used *Questionnaire for waste management*, that is inseparable part of the Monitoring Plan of project Biomass Boiler.

Up to now there is no erected system on the site, which purpose is to capture and burn out the dumping gas. Actions have been undertaken in order the depot meets the national requirements. Introduction of a new production wastes depot is forthcoming.

Project Manager: Dipl. Eng. P. Petrov